

AMENDMENTS TO THE CLAIMS

1 (original). A solid-state image pickup device driving method for driving a solid-state image pickup device comprising:

a plurality of pixels that are provided with a photoelectric converting means and consist of pixels of a first color and a second color arranged in a given pattern,

a plurality of first transfer paths for reading out and transferring signal charges of said pixels, and

a second transfer path for reading out and transferring the pixels transferred from the first transfer paths,

said method including:

a first summation process comprising steps of:

reading out to the aforementioned first transfer paths a plurality of pixels that constitutes all or a part of the pixels of the first color, and

while retaining the signal charges of specific pixels of those read in the previous step mentioned above by maintaining said specific pixels in the read-out state, transferring the other signal charges read in said previous step so as to add the transferred signal charges to the retained signal charges, thereby generating first summed charges;

a second summation process comprising steps of:

reading out to the first transfer paths a plurality of signal charges of the pixels of the second color in the state where said first summed charges are located apart from where said plurality of signal charges of the pixels of the second color are going to be read, and

summing up said signal charges of the pixels of the second color on either one of the first transfer paths or the second transfer path, or both the first transfer paths and the second transfer path, thereby generating second summed charges; and

a sum output process comprising steps of:

transferring said first summed charges and the second summed charges to and from the second transfer path, and

outputting said first summed charges and said second summed charges from the second transfer path.

2 (original). A solid-state image pickup device driving method as claimed in claim 1, wherein:

said first and second summation processes are performed with charges that have been read out to the first transfer paths being transferred in the forward or reverse direction.

3 (original). A solid-state image pickup device driving method as claimed in claim 1, wherein:

said second summation process is performed with a plurality of charges of pixels of the second color being read out to given locations on the second transfer path.

4 (currently amended). A solid-state image pickup device driving method as claimed in ~~any one of the claims from claim 1 to claim 3~~, wherein:

a charge coupled device having charge readout electrodes respectively corresponding to the pixels is provided for the first transfer paths so that said readout and retention are performed by applying charge readout voltages to said charge readout electrodes.

5 (currently amended). A solid-state image pickup device driving method as claimed in ~~any one of the claims from claim 1 to claim 4~~, wherein the manner of driving the solid-state image pickup device can be switched between:

a first driving mode provided to perform said first summation process, said second summation process, and said sum output process, and

a second driving mode provided to read out the charges of the respective pixels individually to the first transfer paths, individually transfer the read charges to the second transfer path, and output said charges from the second transfer path.

6 (original). A solid-state image pickup device driving method as claimed in claim 5, wherein:

said first driving mode is the moving image mode for shooting a moving image, and
said second driving mode is the still image mode for shooting a still image.

7 (original). An image capturing apparatus including a solid-state image pickup device and a driving circuit for driving said solid-state image pickup device, wherein:

said solid-state image pickup device includes a plurality of pixels that are provided with a photoelectric converting means and consist of pixels of a first color and a second color arranged in a given pattern;

said driving circuit includes:

a plurality of first transfer paths for reading out and transferring signal charges of said pixels, and

a second transfer path for reading out and transferring the signal charges transferred from said first transfer paths;

said driving circuit functions to:

generate first summed charges by:

reading out onto said first transfer paths a plurality of pixels that constitutes all or a part of the pixels of the first color,

while retaining the signal charges of specific pixels of those read in the previous step mentioned above by maintaining said specific pixels in the read-out state, transferring the other signal charges read in said previous step, and

adding the transferred signal charges to the retained signal charges;

generate second summed charges by:

reading out to the first transfer paths a plurality of signal charges of the pixels of the second color in the state where said first summed charges are located apart from where said plurality of signal charges of the pixels of the second color are going to be read, and

summing up said signal charges of the pixels of the second color on either one of the first transfer paths or the second transfer path, or both the first transfer paths and the second transfer path; and

transfer said first summed charges and the second summed charges to the second transfer path; and

output the first summed charges and the second summed charges from the second transfer path.

8 (original). An image capturing apparatus as claimed in claim 7, wherein the image capturing apparatus is provided with:

a processing means that is capable of reversing the order of the first summed charges and the second summed charges output from the solid-state image pickup device.

9 (Currently amended). An image capturing apparatus as claimed in claim 11, wherein including:

~~an image pickup device having a plurality of pixels that are provided with a photoelectric converting means and arranged in a given pattern;~~

~~a control means for controlling said image pickup device, and~~

~~an image processing means to which signal charges output from said image pickup device are input, wherein:~~

 said control means is capable of switching in the course of shooting moving images between:

 an omission readout mode, which calls for reading out the signal charges of a part of said image pickup device and outputting the read-out signal charges to said image processing means, and

 a summation readout mode, which calls for reading out the signal charges of the pixels of said image pickup device, summing up the signal charges of a plurality of pixels each, and outputting the summed-up signal charges to said image processing means.

10 (Currently amended). An image capturing apparatus as claimed in claim [[9]] 11, wherein:

 the image pickup device is a CCD solid-state image pickup device having a plurality of pixels of a plurality of colors arranged in a given pattern, and

 the summation readout mode calls for summation of signal charges of a plurality of pixels of the respective same colors.

11 (Currently amended). An image capturing apparatus including:

 an image pickup device having a plurality of pixels that are provided with a photoelectric converting means and arranged in a given pattern,

 a control means for controlling said image pickup device, and

 an image processing means to which signal charges output from said image pickup device are input, wherein:

said control means is capable of switching modes during preliminary measurements between:

an omission readout mode, which calls for reading out the signal charges of a part of said image pickup device and outputting the read-out signal charges to said image processing means,

a summation readout mode, which calls for reading out the signal charges of the pixels of said image pickup device, summing up the signal charges of a plurality of pixels of the respective same colors, and outputting the summed-up signal charges to said image processing means, and

a mixed-color summation readout mode, which calls for reading out the signal charges of the pixels of said image pickup device, summing up the signal charges of a plurality of pixels of different colors, and outputting the summed-up signal charges to said image processing means.

12 (currently amended). An image capturing apparatus as claimed in ~~any one of the claims from claim 9 to claim 11~~, wherein:

the control means is adapted to switch the driving mode to drive the image pickup device between the summation readout mode and the omission readout mode in accordance with the light level of the shooting conditions.

13 (currently amended). An image capturing apparatus as claimed in ~~any one of the claims from claim 9 to claim 12~~ 11, wherein:

the control means is adapted to detect a possibility of generation of moiré and drive the image pickup device in the summation readout mode when there is the possibility of generation of moiré, and in the omission readout mode in the other situations.

14 (currently amended). An image capturing apparatus as claimed in ~~any one of the claims from claim 9 to claim 13~~ 11, wherein:

the control means is adapted to detect a possibility of generation of smear and drive the image pickup device in the omission readout mode when there is the possibility of generation of smear, and in the summation readout mode in the other situations.

15 (currently amended). An image capturing apparatus as claimed in ~~any one of the claims from claim 9 to claim 14~~ 11, wherein

the image capturing apparatus includes a saturation preventing means adapted to be controlled by the control means to prevent saturation of signals in the image pickup device when the image pickup device is being driven in the summation readout mode.

16 (currently amended). An image capturing apparatus as claimed in ~~any one of the claims from claim 9 to claim 15~~ claim 11, wherein:

the control means is adapted to switch the driving mode between:

an omission readout mode, which calls for reading out the signal charges of a part of said image pickup device and outputting the read-out signal charges to said image processing means,

a summation readout mode, which calls for reading out the signal charges of the pixels of said image pickup device, summing up the signal charges of a plurality of pixels, and outputting the summed-up signal charges to said image processing means, and

a full-pixel individual readout mode, which calls for individually reading out and using the signal charges of nearly all the pixels of said image pickup device.

17 (new). An image capturing apparatus including:

an image pickup device having a plurality of pixels that are provided with a photoelectric converting means and arranged in a given pattern,

a control means for controlling said image pickup device, and

an image processing means to which signal charges output from said image pickup device are input, wherein:

said control means is capable of switching in the course of shooting moving images between:

an omission readout mode, which calls for reading out the signal charges of a part of said image pickup device and outputting the read-out signal charges to said image processing means, and

a summation readout mode, which calls for reading out the signal charges of the pixels of said image pickup device, summing up the signal charges of a plurality of pixels each, and outputting the summed-up signal charges to said image processing means, wherein

the control means is adapted to detect a possibility of generation of moiré and drive the image pickup device in the summation readout mode when there is the possibility of generation of moiré, and in the omission readout mode in the other situations.

18 (new). An image capturing apparatus including:

an image pickup device having a plurality of pixels that are provided with a photoelectric converting means and arranged in a given pattern,

a control means for controlling said image pickup device, and

an image processing means to which signal charges output from said image pickup device are input, wherein:

said control means is capable of switching in the course of shooting moving images between:

an omission readout mode, which calls for reading out the signal charges of a part of said image pickup device and outputting the read-out signal charges to said image processing means, and

a summation readout mode, which calls for reading out the signal charges of the pixels of said image pickup device, summing up the signal charges of a plurality of pixels each, and outputting the summed-up signal charges to said image processing means, wherein:

the control means is adapted to detect a possibility of generation of smear and drive the image pickup device in the omission readout mode when there is the possibility of generation of smear, and in the summation readout mode in the other situations.

19 (new). An image capturing apparatus including:

an image pickup device having a plurality of pixels that are provided with a photoelectric converting means and arranged in a given pattern,

a control means for controlling said image pickup device, and

an image processing means to which signal charges output from said image pickup device are input, wherein:

said control means is capable of switching in the course of shooting moving images between:

an omission readout mode, which calls for reading out the signal charges of a part of said image pickup device and outputting the read-out signal charges to said image processing means, and

a summation readout mode, which calls for reading out the signal charges of the pixels of said image pickup device, summing up the signal charges of a plurality of pixels each, and outputting the summed-up signal charges to said image processing means, wherein

the image capturing apparatus includes a saturation preventing means adapted to be controlled by the control means to prevent saturation of signals in the image pickup device when the image pickup device is being driven in the summation readout mode.

20 (new). An image capturing apparatus including:

an image pickup device having a plurality of pixels that are provided with a photoelectric converting means and arranged in a given pattern,

a control means for controlling said image pickup device, and

an image processing means to which signal charges output from said image pickup device are input, wherein:

said control means is capable of switching in the course of shooting moving images between:

an omission readout mode, which calls for reading out the signal charges of a part of said image pickup device and outputting the read-out signal charges to said image processing means, and

a summation readout mode, which calls for reading out the signal charges of the pixels of said image pickup device, summing up the signal charges of a plurality of pixels each, and outputting the summed-up signal charges to said image processing means, wherein:

the control means is adapted to switch the driving mode between:

an omission readout mode, which calls for reading out the signal charges of a part of said image pickup device and outputting the read-out signal charges to said image processing means,

a summation readout mode, which calls for reading out the signal charges of the pixels of said image pickup device, summing up the signal charges of a plurality of pixels, and outputting the summed-up signal charges to said image processing means, and

a full-pixel individual readout mode, which calls for individually reading out and using the signal charges of nearly all the pixels of said image pickup device.